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P2.039 Design of MITICA control and interlock systems

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The construction of MITICA, the full-size prototype of the ITER Heating Neutral Beam Injectors (HNBs) is in progress at the Neutral Beam Test Facility (NBTF) located in Padova, Italy.

The design of the central control (CODAS) and interlock (CIS) systems is progressing taking into account the requirements coming from the MITICA plant units, in terms of number and type of interface signals, data sampling frequency values, operating states, protection actions and required reaction times and reliability. As the HNBs will be ITER components, additional requirements derive from the ITER plant control design handbook that specifies the design criteria and technologies to be applied to ITER plant systems.

In MITICA a distinction must be made between plant units that will be part of the HNB, such as the power supply systems, and plant units that are auxiliaries, such as the gas and vacuum system. In the NBTF these components shall interface with MITICA CODAS and CIS, whereas in ITER they will be autonomous plant systems providing services to the HNB. The distinction reported above suggests defining the architecture of MITICA Instrumentation and Control (I&C) as split into the following functional blocks:

- HNB plant system – including components that will be part of the HNB;
- Auxiliary plant system – including all operational plant units that need control in the NBTF but are implemented outside the ITER HNB;
- Diagnostics plant system – including the diagnostic instrumentation
- Central I&C (CODAS and interlock)
- Communication infrastructure.

The paper will present the requirements for MITICA CODAS and CIS and will derive the detailed system architecture. The design of CODAS and CIS will be discussed with reference to the lesson learned in the implementation of SPIDER CODAS and CIS (the NBTF ion source test bed) and to the technologies suitable for the implementation.

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